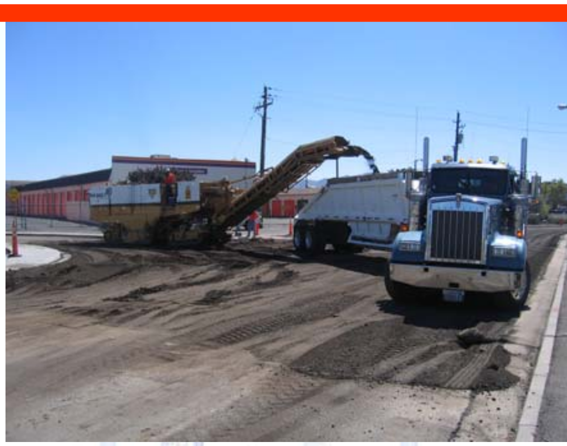
MONTANA DEPARTMENT OF TRANSPORTATION

HIGHWAY PROJECT COST ESTIMATING AND MANAGEMENT (HPCE)

RFP NUMBER: HWY-308059-JY

PROPOSAL SECTIONS 1-4 & 6



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1.0 PROJECT OVERVIEW

Introduction

Sierra Transportation Engineers, Inc. (STE) is pleased to submit this proposal in response to Montana Department of Transportation (MDT) Request for Proposal (RFP) Number HWY-308059-JY entitled "Highway Project Cost Estimating and Management (HPCE)."

We have assembled an outstanding team of experienced professionals and a complete set of in-place resources to establish highway cost estimating and management procedures to aid MDT in more efficient cost estimating. Our project team composed of engineers, economists, and statisticians has extensive experience in successfully completing numerous projects. We are confident that we will provide the State of Montana an effective product that satisfies all the requirements established in the RFP on time and within the established budget.

We believe that our proposed project team has several key attributes that will result in an outstanding outcome for this project. These attributes are:

Selected to Perform a Similar Study for Nevada Department of Transportation
The proposed project team has been selected to conduct a similar study for Nevada DOT called *"Methodology to Improve Highway Construction Project Cost Estimates for Transportation Programming Activities."* Dr. Raffiee of University of Nevada, Reno (UNR) and Dr. Alavi of STE will be the Principal Investigators. The project is anticipated to start during the last quarter of 2006. We believe that there are many lessons to be gained from the Nevada DOT project that can be shared with MDT.

Strong Project Management Experience
STE's proposed Principal Investigator, Dr. Sirous Alavi, P.E., has successfully managed over $35 million of transportation engineering research projects for Federal and State agencies over his professional career. He is a graduate of the University of California at Berkeley with over twenty years of Transportation Engineering experience. He recently served MDT as the Project Manager for "Ride Specification Review Project." Some of his relevant project management experience includes serving as the Co-Principal Investigator on the Federal Highway Administration (FHWA) WesTrack project, "Accelerated Field Test of Performance-Related Specifications for Hot-Mix Asphalt Construction"; serving as the Joint-Principal Investigator on NCHRP Project 9-20, "Performance-Related Specifications for Hot-Mix Asphalt Construction"; and serving as the Principal Investigator for two consecutive Long Term Pavement Performance (LTPP) Western Regional Contracts, which included several test sections in the State of Montana. During his numerous trips to Montana and also extensive analysis of Montana roadway data, Dr. Alavi has become familiar with Montana roadway performance, practices, and construction.

Extensive Expertise in Understanding DOT Procedures for Cost Estimating and Management
Mr. George Way, P.E., STE's Chief Engineer, has 35 years of experience with Arizona Department of Transportation (ADOT). He retired from ADOT in 2004. Mr. Way served ADOT as the Chief Pavement Design Engineer and served on an ADOT team in the 1990's that developed a formal Project Management Process for ADOT. Mr. Way's experience on working on this multi-year study, which concluded with the adoption of a formal Project Management Process, will be of great help to this MDT study. He is an active

member of many engineering associations and societies and recipient of numerous awards. He has authored over a hundred papers and lectured all over the world.

Exceptional Knowledge and Experience in the Area of Transportation Economics
STE is pleased to have two distinguished Professors of Economics with expertise in transportation economics on its team. Professor Kambiz Raffiee is a Foundation Professor of Economics, Associate Dean and Director of the MBA program at the College of Business Administration at the University of Nevada, Reno (UNR). He received a Ph.D. in Economics from the University of Oregon and his area of expertise includes economic impact of transportation systems.

Professor Shunfeng Song is the Chair Person of the Department of Economics at UNR. He received a Ph.D. from the University of California at Irvine in Economics. His areas of expertise include transportation economics, urban economics, and real estate economics. Both distinguished Professors are recipients of "Best Researcher of the Year Award" by the Nevada Alpha Chapter of Beta Gamma Sigma, the highest honor society for collegiate schools of business in the US.

Exceptional Knowledge and Experience in the Area of Statistical Analysis
Dr. Alavi, Mr. Way, Dr. Raffiee, and Dr. Song all have excellent understanding and working knowledge of statistical analysis. However, to complement the team, STE is pleased to have Dr. George Fernandez, Professor of Applied Statistics from UNR on its team. Dr. Fernandez received his Ph.D. from Texas A&M University and his areas of expertise include developing *SAS* statistical applications in data mining & applied statistics, pavement performance analysis, and network optimization models in civil engineering.

Established Relationship with Federal, State, Local, and International Agencies
Members of the project team have served the highway community for many years and have established contacts with Federal, State, Local, and International agencies. We believe those contacts will be instrumental in quickly identifying the right agency personnel to seek information and insight into their past and current efforts in enhancing their cost estimation practices that can be related to this project.

Comprehensive Corporate Structure to Comply with MDT Contract Regulations
STE has established a corporate accounting and administrative infrastructure that has been audited and approved for conducting government contracts. We have shown our corporate ability in successfully running complex and multidisciplinary projects with MDT on the Ride Specification Review project and our ongoing five year contract with FHWA on LTPP Materials Reference Library. STE is confident that it can comply with all MDT contract regulations during the execution of this project.

As required by the RFP, this proposal has been organized into sections that follow the format of the MDT RFP. STE understands and will comply with *Section 1.0: Project Overview and Instructions* and its subsections.

SECTION 2: RFP STANDARD INFORMATION

STE understands and will comply with *Section 2.0: RFP Standard Information* and its subsections.

SECTION 3: SCOPE OF PROJECT

3.0 PURPOSE

The overall objective of this project is to develop a comprehensive document to determine the best practice of efficient highway cost estimating for Montana. STE has assembled an expert research team with experience in project development and cost estimating processes. The STE team also has expertise in the economic factors that drive up the cost of projects and general knowledge of the DOT's project cost estimating practices. Also, as stated in Section 1.0, the proposed team will be conducting a similar study for Nevada DOT during the same time period as the MDT project; many findings and lessons learned can be shared between the two projects. These attributes make the STE team well suited to meet the challenge of providing expert advice and recommendations on developing best practices to improve the initial project cost estimating process.

Ultimately, MDT needs to have a cost estimating process and procedure that is rational and understandable to not only MDT personnel and management but also the numerous stakeholders outside of the MDT. STE is pleased to share with MDT its plan for addressing the tasks set forth in the RFP.

<u>Background on Cost Estimation</u>
The literature demonstrated that underestimating project costs is endemic across the world and consistent over time (Flyvbjerg, et al., 2002).

A more accurate cost estimation is to build an easy-to-use spreadsheet that includes all project attributes, paying special attention to items that are more likely to be overlooked during the estimation process. Excluding or underestimating the cost of such items (e.g., crossovers, turn lanes, curb and gutter, landscape, bikeway, etc.) has resulted in major miscalculation of project costs. Assigning a relatively reasonable cost to unique attributes is more prudent than omitting them completely.

The total project cost consists of two parts: *common* and *unique* costs. Common cost is associated with common items defined as those for which a relationship between alignment length and cost could be determined and varied mainly by the classification of the roadway. Unique cost is associated with items that are often overlooked when initial estimates are created, usually uncorrelated with alignment length. The common cost can be considered as the average cost, while the unique cost can be considered as deviations or residuals.

Therefore, to better estimate cost is to better identify common and unique attributes for a transportation project. This can be done in two steps. The first step is to establish an initial estimate based on the appropriate common cost factor (CCF) using historical data. CCF includes costs for everything common to all projects within a geometric standard, such as stone, asphalt, grading, pipes, erosion control, pavement, shoulder, etc. Put differently, CCF is the cost of every common element averaged and factored according to highway type.

The second involves the selection of quantities of unique items and estimation of their costs. Unique attributes are often omitted in initial estimation practices which may include turn lanes and traffic signals, crossovers, median type, shoulder or curb and gutter, and large drainage structures. Costs of unique items are specific to projects and locations. The principal issue here is to identify which unique items could be ascertained at a sufficient level of detail during early project development. The identification of these items and the appropriate quantities to be included in the estimate would require a thorough project review involving the expertise of a diverse group of specialists. In a simple equation:

Cost = *Common Cost* + *Unique Cost*

It is worth noting that some cost adjustments are necessary for specific projects. For example, some overhead costs may be independent of length or scale. Hence, when calculating cost per mile, the average tends to get smaller for longer roads. Also, scale economies exist in transportation projects in terms of the number of lanes (width), the number of miles (length), and shoulders and median (e.g., four-lane highway and six-lane highway have the same shoulder and median, but the road capacity is quite different).

MDT quite rightly has stated and listed in the RFP many areas in the project development process that may potentially contribute to initial project cost estimate issues. The RFP listed areas include:

Changes in Project Scope and Location

At the development stage, project scope, and location are to be decided. Two aspects deserve special attention. First, it is important to construct an exhaustive list of often overlooked project features and give some reasonable estimate for each of the unique items. Second, using cost-benefit and feasibility analyses, evaluate various scenarios for different locations.

Ultimate Environment Mitigation Requirements

Environmental mitigation could become more of an issue due to the following factors: changes (more strict) of environment standards by the government, more awareness or stronger interest of environment protection by the public or environmentalists, and increase in mitigation costs.

Lack of Proper Estimates with Preliminary Engineering, Utilities, and Right-of-Way Costs

Cost of right-of-way consists of cost of land, cost of building, cost of other improvements, and cost of damages. Cost estimation involves identifying quantities and values for land, buildings, improvements, and damages. Cost could be miscalculated if quantities are incorrectly estimated. It could be significantly underestimated if historical data are used without paying attention to market changes. Unexpected utility involvement is more common in urban areas than in rural areas, in older districts than in new suburbs, for expansions of existing infrastructures than for new transportation projects. Unexpected utilities occur for additional lighting, large drainage structure, and removal or changes of existing underground utility system.

Delay in Project Delivery from Initiation to Contract Letting

Any delay results in additional costs and increasing uncertainties. This is due to inflation, changes of expectations, and modifications of the projects.

Unforeseen Engineering Complexities and Constructability Issues

This is a typical cost of unique items. Additional cost adjustments can be factored into the process to minimize this impact.

Changes in Economic and Market Conditions

Cost of any transportation project is closely related to economic and market conditions. Although none can be based on perfect forecasts, statistical analysis can help in providing some guidelines about time trends, seasonal variations, and ranges of estimates. It is important to adjust cost estimation by examining changes in domestic and international economic and market conditions.

Increased Local Government, Community, and Stakeholder Expectations
Costs increases with higher expectations. Higher expectations cause more unique items for transportation projects, including materials, additional safety, enhancement in designs, and more environmental improvements (e.g., noise and air pollution reductions).

Understating Incidental Cost Issues
Incidental costs tend to be underestimated, partly because it is hard to measure or they do not occur often. Incidental issues can include human errors, unexpected time delay, dramatic weather changes, natural disasters, and energy crisis. Incidental costs could also include DOT staff and management meetings and hands-on training. Incidental issues tend to be random. Based on historical data of similar projects, a reliable estimate range and deviation for the incidental costs can be obtained.

Changes in Traffic Control Needs due to Design or Traffic Growth
Traffic demand is dynamic, especially in urban areas. Over time, both population and employment spatial patterns change, causing changes in traffic control needs and traffic growth. Future demand for traffic management depends on urban planning and local economy. Unique items of a transportation project, such as new traffic signals, need to be addressed accordingly.

Overall, all costs can be listed in a template, which can be modified with more information and progress of project. Calculation of common and unique costs needs to be based on realistic information, interviews, and field inspections. As stated in the RFP, the management systems listed are a good resource for populating the cost template.

3.1 SCOPE

The STE team has developed a detailed work plan that entails the scope of activities necessary to successfully complete the project objectives on time and within budget. Figure 3.1 represents a schematic of the flow of activities envisioned in the STE Work Plan. Based on the RFP instructions (*Section 1.6.1 Organization of Proposal*), each activity listed on the STE Work Plan is thoroughly described in the sections that follow.

Detailed Project Timeline
Figure 3.2 represents the proposed time schedule for the successful completion of this project. The kick-off meeting will occur three weeks after the start of the contract to allow the STE team time to properly prepare for the meeting as described later in Section 3.3.1. All tasks are described in detail in *Section 3.2 Tasks*.

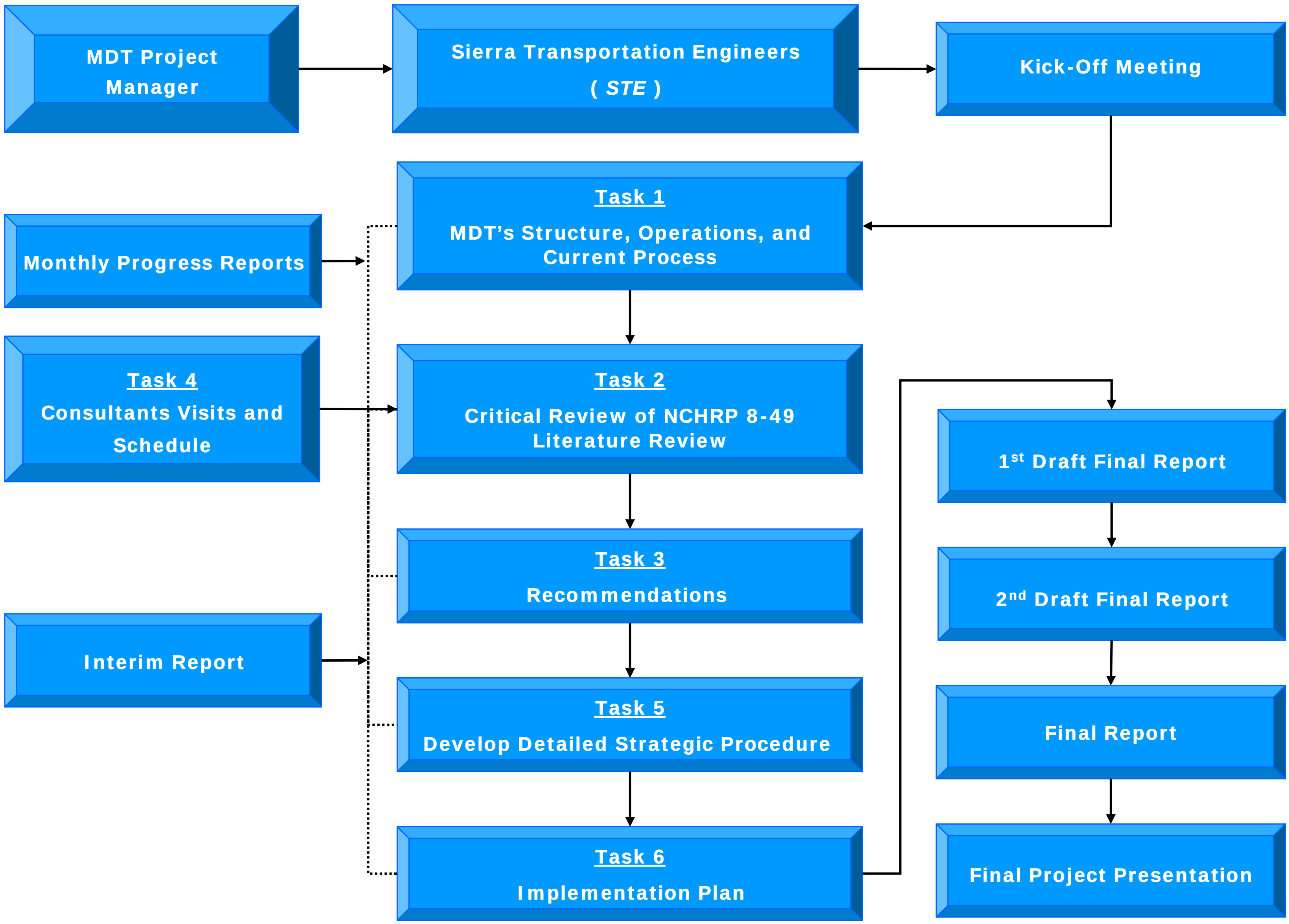


Figure 3.1. STE Work Plan.

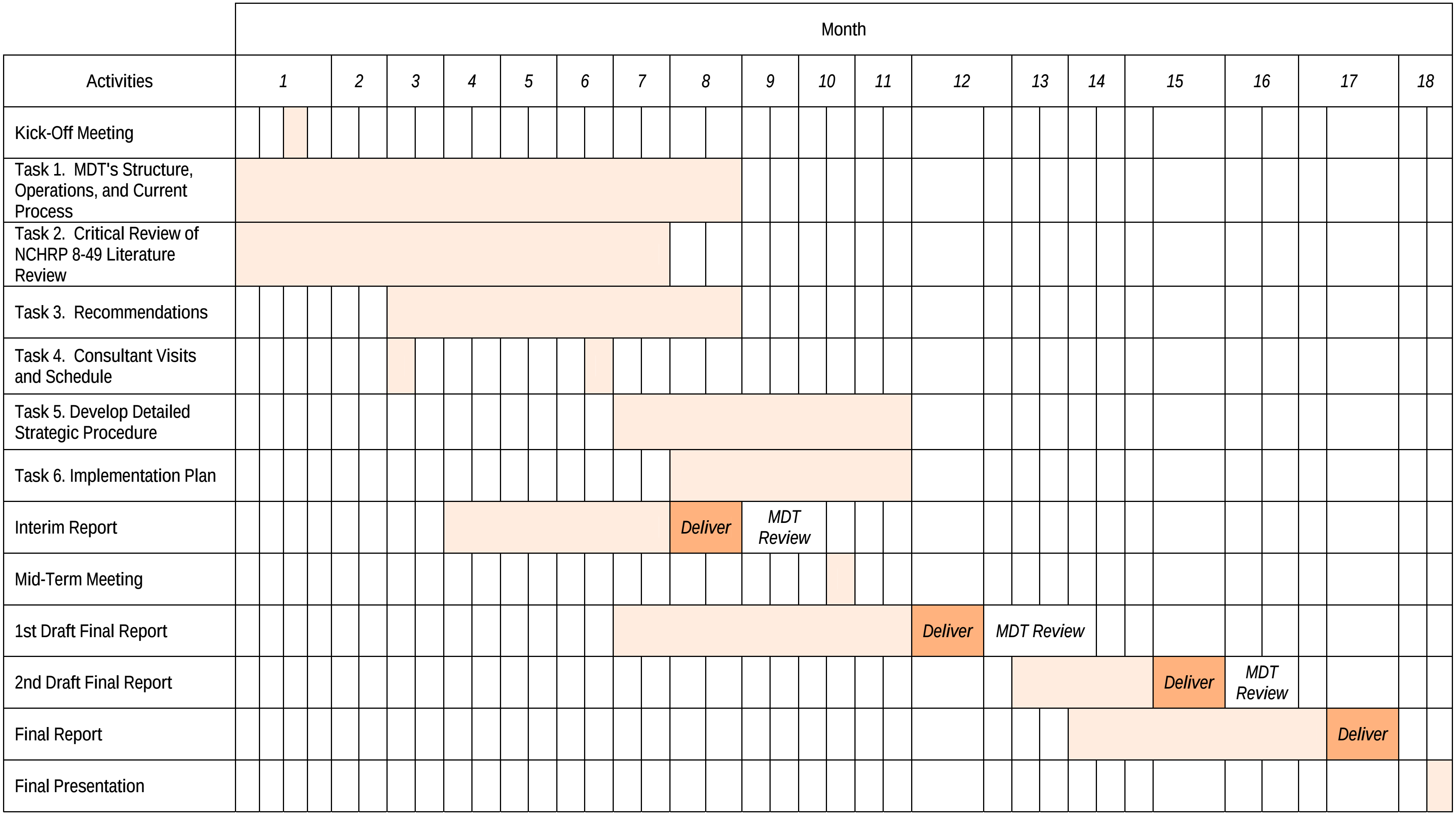


Figure 3.2. Proposed Time Schedule.

3.2 TASKS

As presented earlier, Figure 3.1 shows a schematic of activities in the STE Work Plan. The following sections describe each task in detail.

3.2.1 Task 1: MDT's Structure, Operations, and Current Process

STE will work with the various project development sections within MDT to thoroughly understand their organizational structure, methods of operations and how each of these areas develops its initial cost estimate. Such areas would most likely include all of the major Divisions including Highway and Engineering Division, Planning Division, District Offices and Administrative Division. In addition STE with the help of the MDT Project Manager would obtain more detailed information from the various Sections within the project development process which could include but not be limited to the Right-of-Way Section, Project Development Section, Environmental Section, Construction Section, Materials Section, Traffic Section and Utility Section, and any other Section recommended by the MDT.

Interviews will also be conducted with members of the private sector that may affect cost estimation. Such individuals may include representatives of various trade associations that may represent the real estate market, materials suppliers, traffic control industry, environmental associations and utility companies, and others identified by MDT.

STE will consult with MDT about who should be surveyed and the survey questions to be asked of Department personnel and private individuals. All interviews will be coordinated with MDT approval, and all questions and survey questions will be presented to MDT in draft form and be approved by MDT before the interviews are conducted or surveys distributed.

STE will structure the Task 1 interviews and survey questions to delineate the strengths and weaknesses of MDT's current cost estimating process. There will be an emphasis on the following points:

- State's entire business process regarding highway project cost estimation; including segregation between low-level projects that reflect a standard approach in costing to more complex projects that have a higher risk of cost variables.
- Documentation of historic cost estimates vs. actual completed costs by project types (will be updated by the MDT once developed and used as a tool to track performance improvement in estimating). This product will be developed in Excel.
- Recognizing different environmental issues, location factors (rural/urban) and project work types/scopes that increase complexity of developing accurate cost estimates.
- Identification of issues with initial cost estimates at time of nomination.
- Regional differences of project specific costs.
- Tracking of project cost estimates throughout the phases of the project development process.
- The review of the MDT's existing procedures on uniform cost estimating methods highlighting the consistency or inconsistency of the system.

STE will use surveys and interviews as well as review of any historical cost estimating data to obtain a thorough understanding of how MDT develops its initial project cost estimate and attempt to quantify how the various enumerated issues can change the ultimate project estimate.

In addition, various management systems (active and pending) by the State as described in RFP Appendix D will be utilized to better understand the current estimating process and project development procedures. During the first team visit to the State, STE will request access to view the various management systems available at the State and will seek information on how these systems are interrelated during the different phases of the cost estimating process. The systems of interest include:

- Pavement Management System (PvMS).
- Congestion Management System (CoMS).
- TIS Road Log.
- Bridge Management System.
- Program and Project Management System (PPMS).
- Maintenance Management System (MMS).
- Safety Management System (SMS).
- Site Manager.
- Proposal and Estimates System (PES).
- Letting and Award System (LAS).

Based on the review of those systems, STE will request a sample of data input and output of selected parameters, which are considered to be important in the cost estimating process. As described in Task 3, this data will also be used for economical and statistical analysis for developing risk assessment procedures.

Knowledge gained from the upcoming project with Nevada DOT *"Methodology to Improve Highway Construction Project Cost Estimates for Transportation Programming Activities"* will be very beneficial to completing activities described in Task 1.

3.2.2 Task 2: Critical Review of NCHRP 8-49 Literature Review

STE will review the literature review information available in NCHRP 8-49 *"Procedures for Cost Estimation and Management for Highway Projects During Planning, Programming, and Preconstruction"* scheduled to be completed in September, 2006. During the annual meeting of the Subcommittee on Design on June 16, 2006 in Orlando, Florida, the NCHRP 8-49 researchers identified ten key principles that ensure consistent and accurate estimates, which are:

- Make estimating a priority.
- Set a project baseline cost estimate.
- Create cost containment mechanisms.
- Create estimate transparency.
- Protect estimators.
- Complete every step in estimate process.
- Document estimate basis.
- Identify project risks and uncertainties.
- Anticipate external influences.
- Perform estimate reviews.

The NCHRP 8-49 is a work-in-progress that was granted to Texas A&M University on March 14, 2004 with the new completion date of September 30, 2006. The project's key goals are to: examine the cost estimation techniques and management practices for highway projects during planning, programming, and preconstruction, to develop a critical review of current cost estimating practices, and identify possible techniques and methods to improve highway cost estimation. STE will thoroughly review the findings of NCHRP 8-49.

In addition, STE's team has experience in the area of project cost estimating. They are aware of many of the problems that afflict DOT's in developing projects. As an example, STE's Chief Engineer, Mr. Way, is the retired Design Engineer with 35 years of experience at ADOT. In the 1990's he served on an ADOT team that developed a formal Project Management Process. The problem statement from that study identified three significant problems that contributed to Department rework and unnecessary work. These problems were extensively studied by the ADOT team. Of note from the results of ADOT's study, the problems they identified were very similar in nature to the issues identified in this MDT RFP. The ADOT problems included scope creep as a major problem in accurately estimating the cost of a project. Scope creep was defined as a change in the original scope, which adds cost and/or time to the project. Another problem was that it took too long to get a project developed and ready for bid and the development process is disconnected from the customers (internal and external of the Department). To address these problems, the ADOT team conducted extensive interviews and surveys. Mr. Way's experience working on this multi-year study, which was concluded by the adoption of a formal Project Management Process, will be of great help to this study.

__Literature Search__

STE team members have conducted numerous research projects in the past and are among the top national experts in performing high quality literature reviews. We will utilize our access to academic publications, industry reports, agency reports, and access to national databases such as TRB TRIS. These activities will ensure the most successful literature review possible. The following is STE's preliminary review of relevant literature:

__Review of Literature__

The problem of underestimating costs in public work is not new (Arditi, Akan, and Gurdamar, 1985; Bruzelisu, Flyvbjerg and Rothengatter, 1998; Davidson and Hout, 1989; Hufschmidt and Gerin, 1970; Mackie and Preston, 1998; Merewitz, 1973a and 1973b; Merrow, 1988; Morris and Hough, 1987; Nijkamp and Ubbels, 1999). These studies provide an overview of cost estimation management in various public projects including highways, freeways, rail and roads.

Recently, Flyvbjerg, Holm and Buhl (2002) provided a statistical analysis of cost of transportation infrastructure projects using a sample of 258 projects worth $90 billion (in 1995 prices) in 20 countries on 5 continents. The project types were bridges, tunnels, highways, freeways, high-speed rail, urban rail, and conventional (interurban) rail, ranging in construction cost from $1.5 million to $8.5 billion (1995 prices). The measures of cost used in the study are: actual costs, defined as real costs determined at the time of completion of a project, and estimated costs, defined as budgeted or forecasted costs at the time of decision to build to build. The study then calculated the difference between actual and estimated costs in percentage of estimated costs with all costs measured in fixed prices. The study reports that (1) costs are underestimated in 9 out of 10 transportation infrastructure projects, actual costs are on average 34% higher than estimated costs for tunnels and bridges, (2) actual costs are on average 20% higher than estimated costs for road projects, and (3) there is a lack of comprehensive project management plans to mitigate the occurrence of cost underestimation in transportation infrastructure projects.

As a result of frequency of cost underestimation of transportation infrastructure projects, there is now a continuous commitment by various federal, state, regional and local transportation agencies to take on new initiatives to launch programs to mitigate the discrepancy between budgeted costs and estimated costs of projects they sponsor. It is now recognized by the majority of these transportation agencies that cost underestimation of transportation infrastructure is not a zero-sum game and it potentially will affect both their credibility as a public agency in public relations and budget requests. Specifically, transportation agencies will have to delay or cancel other transportation infrastructure projects as a result of cost underestimation of a particular project.

It is also recognized that cost overestimation of transportation infrastructure projects is a serious matter because it can lead to missed opportunities to fund essential projects. Cost overestimation can result in an erroneous priority list of transportation infrastructure projects.

The studies by Virginia Transportation Research Council (December 2004), NCHRP Project 8-49, General Accounting Office testimony on cost and oversight of major highways and bridge projects before the Congress's Committee on Appropriations (May 8, 2003), FHWA's major (mega) projects (2004), and FHWA's guidelines on major project program cost estimation (June 4, 2004) are some of the most up-to-date research to provide a thorough understanding of the best practices into cost estimation management and project cost estimation procedures of transportation infrastructure projects.

The study by Virginia Transportation Research Council (VTRC), a cooperative organization sponsored jointly by the Virginia Department of Transportation (VDOT) and the University of Virginia, attempted to develop a definitive, consistent, and well-documented approach for estimating the cost of construction projects in Virginia. The study was prompted in part by the January 2001 Virginia's Joint Legislative Audit and Review Commission that the state's six year $9 billion transportation plan understated the costs of projects by up to $3.5 billion. One of the major focuses of the study was on its recognition that project scoping was essential for accurate cost estimation of a project. This was in response to a previous VDOT scoping committee that determined that VDOT didn't have a consistent and uniform approach to cost scope projects that resulted in underestimation of cost of projects sponsored by VDOT. The VDOT scoping committee defined scoping as "a systematic means of defining the purpose, need, and characteristics of proposed improvement projects." The study reports that based on a 2002 audit of the Springfield Interchange project in Northern Virginia, VDOT had to postpone or cancel 166 projects because of costs underestimation.

The study also accurately states that the problems associated with cost underestimation of transportation projects are not unique to VDOT and many other DOTs cope similar problems. The members of the research team of VTRC conducted a survey of 9 states in the Spring 2001: Delaware, Florida, Kentucky, Minnesota, Pennsylvania, Tennessee, Texas, Washington, and West Virginia to identify their practices for cost estimation of projects. The findings of the surveys were compared against the cost estimation practices of VDOT. The recommendation was to adopt a revised version of the construction cost estimation tool used by VDOT's Fredericksburg District.

The template used by Fredericksburg District is an Excel worksheet to estimate construction costs for various transportation projects including bridges. It uses an annually compounded inflation rate and a method to estimate preliminary engineering costs for road and bridge construction. Moreover, the spreadsheet asks the user if there are additional costs associated with the project, which were excluded during the preliminary cost estimate, such as environmental mitigation, landscaping, bikeways, etc. The template does not include right-of-way and utilities costs. These were added to the template by VDOT before statewide adoption. Testing and calibration of the expanded template for cost estimation was completed in the summer 2003. Using a sample of completed VDOT construction projects throughout the state, the revised template provided results that, on average, exceeded budgeted costs by 22 percent.

The testimony by General Accounting Office on cost and oversight of major highways and bridge projects before the Congress's Committee on Appropriations on May 8, 2003 summarizes costs and oversight of major highway and bridge projects in the U.S., discussing recent efforts by FHWA to improve the management and oversight of these projects, and describing the options that GAO have identified to improve federal oversight of these projects. As sated in the testimony, a major highway or bridge construction usually involves four stages: (1) planning, (2) environmental review, (3) design and property acquisition, and (4) construction.

The study by FHWA on its major (mega) projects published in 2004 provides detailed information on the specifics of management and oversight of major highways and bridge projects. As part of its commitment for continuous improvement, FHWA's has established guidelines on how to improve management and oversight of major highways and bridge projects. FHWA publication, "*Major Project Program cost Estimating Guidance,"* dated June 4, 2004, a checklist on the important cost items that may influence a transportation infrastructure project has been provided, which includes: preliminary engineering, right-of-way, construction cost, contracting technique, economic impact, competition, wrap up insurance, specialized technology. Material availability, construction time, construction incentives, protection of the traveling public, design progression, construction administration, construction contingencies, environmental document preparation, environmental mitigation/enhancements, utility adjustments, railroad and transit adjustments, public outreach, management reserve, aesthetic treatments, and cost escalation.

The STE literature review will focus on understanding the cost estimating and management practices during different stages of a project life; namely:

- Conceptual Stage - Includes project conception, requirement establishment. Lead stakeholder is the client.
- Design Stage - Includes scheme design and also detailed design. Lead stakeholder is the designer team.
- Tender Stage - Includes tender documentation, biddings, tender appraisal and appointment. The lead stakeholder for tender documentation is the client's estimator. The lead stakeholder for the biddings is the contractor. For tender appraisal and appointment the lead stakeholder is the client.
- Pre-Construction Stage - Includes project planning and resource organization for which the lead stakeholder is the contractor.
- Build Stage - Includes construction and project completion for which the lead stakeholder is the contractor.

The result of STE findings will be summarized, tabulated, and reported to MDT via monthly progress reports. Those results will be instrumental to the STE team in providing a comprehensive document to determine the best practice of efficient cost estimating for MDT.

3.2.3 TASK 3: RECOMMENDATIONS

STE will investigate and frame recommendations regarding use of inflation rates as reported from the literature research and in keeping with good economic practices. STE is well suited to do this task since expert economists and statisticians are on the team. STE will also examine the use of Monte Carlo simulation and other risk assessment techniques to determine whether if any such approaches would be worthwhile to incorporate into MDT's best practices. STE will investigate the use of contingency factors to provide for likely cost increases to meet changes in right-of-way, drainage, materials, geotechnical investigations, traffic control, utility, environmental or other unforeseen needs that will occur in the future.

STE understands that this is not software development project. Since there are several databases available (including various management systems listed in the RFP Appendix D), STE believes that a thorough statistical analysis of project data (i.e., available databases and data gathered through surveys and interviews) will lead to the development of strategic procedures that MDT can implement to effectively manage and track the cost estimation process as requested in Task 5. With this in mind, STE has developed a framework for statistical analysis of the data to understand the differences between initial estimated costs and final project costs. The following table provides a summary of variables that will be considered in the study.

Response Variable	Variable Type
Differences between the actual and projected cost difference	$ amount
Project ID Variable	**Variable Type**
Project ID	Alpha numeric
County	Categorical
Explanatory Variable	**Variable Type**
Project type	Categorical (N: New; M: Maintenance)
Project Region	Categorical
Change in project scope	Categorical (Yes/No)
Change in project location	Categorical (Yes/No)
Insufficient knowledge of right-of-way costs	Categorical (Yes/No)
Ultimate environmental mitigation requirement	Categorical (Yes/No)
Unforeseen engineering complexities	Categorical (N: None; M: Moderate; H: High)
Unforeseen constructability issues	Categorical (N: None; M: Moderate; H: High)
Changes in traffic control needs	Categorical (N: None; M: Moderate; H: High)
Increased local government, community and stakeholders expectations	Categorical (N: None; M: Moderate; H: High)
Initial project cost	Continuous ($)
Total project duration in months	Continuous(Months)
Differences in months between the actual and the projected time of completion	Continuous (Months)
Delay in months in project delivery from project initiation to constructability letting	Continuous (Months)
Average Percent change in the cost of inputs (labor, raw materials etc.	Continuous (%)
Average Percent change in incidental cost	Continuous (%)
Average Percent change in traffic growth	Continuous (%)
Average Percent change in utility costs	Continuous (%)

First, the suitable projects from the available data bases will be selected and an identification number will be assigned to each of the selected projects. For each of the identified project, information on the above listed explanatory variable attributes will be recorded from the available existing databases. Telephone surveys will also be utilized to obtain information if any of the listed explanatory variables are missing for any identified projects. Ten percent of the available projects with a wide range of attributes will be selected and will be utilized as hold-out sample to study the differences between initial estimates and final project costs. Statistical analysis will be performed using SAS software version 9.1.3.

3.2.4 Task 4: Consultant Visits and Schedule

With assistance from MDT, STE will develop a list of contacts for interviews at the headquarters, area offices, and private sector entities (i.e., utilities, design firms, material suppliers, etc). STE will send a letter with a questionnaire to each contact person and will request response to the questions related to cost estimation and management procedures. After review of responses, STE will schedule interviews with a selected group of individuals to further acquire information. STE envisions that there will be a need for two trips each lasting seven days (five working days) to take care of all the interview and data collection process to support Task 1 activities. Dr. Alavi, Dr. Raffiee, and Mr. Way will conduct these visits.

3.2.5 Task 5: Develop Detailed Strategic Procedure

Based on all the tasks of this study including literature review, interviews, surveys, statistical analysis and the overall experience of the team a detailed strategic procedure will be developed to effectively manage and track the cost estimation process. The form of this process may include cost estimating inputs from MDT offices and divisions including District Offices, Planning Division, Highway and Engineering Division and the Administrative Division as well as other appropriate sections. Such a process may include a process comparing initial cost estimates to statewide or even regional cost values and providing for reasonable inflation adjustment factors. Based upon the results of this study other cost estimating adjustment factors and statistical tools may be needed to account for the possibility of exceptional right-of-way cost increases occasioned by extraordinary population growth or other circumstances. Likewise materials costs may need some special cost adjustments or forecasting tools to account for future materials shortages due to national or international shortages or disruptions to supply. Heightened environmental concerns in sensitive areas may require regions within Montana to have a greater initial cost estimate and require the possible need for a somewhat unique cost estimating process. This final product of the study will provide a process, where different offices and divisions within the MDT can apply the cost adjustment factors or inflation factors, statistical cost estimating to improve the initial cost estimate and explain it in a rational manner.

3.2.6 Task 6: Implementation Plan

The study will develop a detailed implementation plan with appropriate timelines to support the study objectives. Responsibility centers within MDT will be suggested in coordination with the project manager and will be as clearly defined as practical within the MDT Administrative structure. Realistic performance measures to determine to what degree the initial cost estimates have been improved after implementation of the study results will be developed and provided with the final report. The overall project initial project cost will be tracked and quantified, however, the performance measures will also need to be quantified in order to reflect changes from the original project scope, such as the original project length, number of lanes, alignment etc. The work plan will provide a means to recognize such changes and account for them accordingly while still providing a logical means of performance measurement.

3.3 MEETINGS AND REPORTS

STE understands and will comply. Dr. Alavi is very familiar with the required reporting format as he has utilized similar formats for preparing and submitting over a hundred reports (i.e., progress reports, interim reports, final reports) for NCHRP, FHWA, and state projects over the last decade. Dr. Alavi has also had the privilege of serving as the project manager for the MDT Ride Specification Review project and has successfully submitted progress reports, a draft final report, a final report, a project summary report (PSR), and a series of implementation products to MDT on time.

3.3.1 Project Kick-off Meeting

STE team is requesting that the kick-off meeting between the MDT Project Manager, the Technical Panel, and the STE team members occurs three weeks after the start of the contract to allow the project team sufficient time to develop a draft agenda, submit it for approval to the MDT Project Manager, and finalize meeting materials and handouts. The one day kick-off meeting will be attended by Dr. Alavi, STE Principal Investigator, Mr. Way, STE Chief Engineer, and Dr. Raffiee, STE Economics Consultant. During this meeting, Dr. Alavi will present the project time line and discuss STE's approach to the detailed work plan presented in this proposal. With input from the MDT Project Manager, STE will prepare the agenda and meeting materials and then provide them to MDT for circulation among the Technical Panel in advance of the meeting. STE will assemble the meeting notes and provide them to the MDT Project Manager for distribution within five business days after the meeting is held. Depending on the agenda topics, STE team is prepared to stay in Helena for additional day(s) to discuss project details with MDT personnel or assist in gathering the requested information from MDT.

3.3.2 Other Meetings

STE proposes a mid-term meeting to review project to date. STE will prepare an interim report for MDT Project Manager and Panel to discuss the mid-term findings and provide the report to MDT six weeks prior to the meeting. This meeting will occur during month 10 of the project and will enhance the communications and dialogue that are needed to receive the MDT inputs and recommended revisions to the continued project activities. STE will also attend a final meeting in Helena to formally present the completed products to the State and interested individuals.

3.3.3 Progress Reports

Due to the relatively short duration of this project (i.e., 18 months), STE believes that there is a need for routine communication with the MDT Project Manager. STE will prepare monthly progress reports for submittal to the MDT Project Manager. These reports will describe the activities that occurred on each task during the reporting period, summary findings, percent accomplishments and expenditures versus project schedule and budget respectively. As described in Section 3.3.2 above, there will also be an interim report prepared by STE and submitted to MDT prior to the mid-term meeting.

3.3.4 Final Report

A draft final report will be submitted to the MDT Project Manager at the end of month 12 of this project. The draft final report will be a complete report documenting all the activities that were conducted under each task. As stated in the RFP, it will document what was done, why it was done, and how it was done. Based on the MDT Project Manager and the Technical Panel review comments, the draft final report will be revised into the second delivery of draft final report. After receiving MDT's final review comments, STE will deliver the final report which will also contain the revised implementation plan based on the findings of this project and input from MDT.

3.3.5 Project Summary Report (PSR)

A project summary report (PSR) will be submitted. STE Principal Investigator, Dr. Alavi, is familiar with the required format and information for a PSR as he recently submitted the PSR for newly completed MDT Ride Specification Review Project.

SECTION 4: OFFEROR QUALIFICATIONS

4.0 STATE'S RIGHT TO INVESTIGATE AND REJECT

STE understands and will comply.

4.1 OFFEROR INFORMATION REQUIREMENTS

4.1.1 References

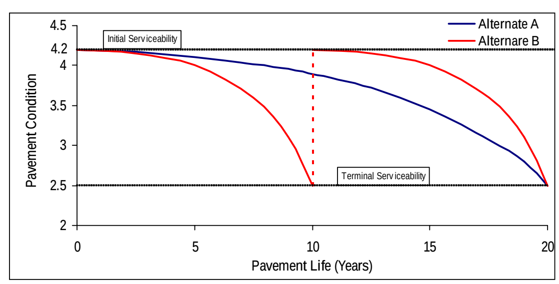
Montana Department of Transportation Ride Specification Review –

Contact Person: Ms. Sue Sillick.,
MDT Research Programs Manager
Contact Telephone Number: 406-444-7693
Dates of Service: July 2004 – June 2006
Cost: $171,000
Project Status: Completed within budget
Project Manager: Dr. Sirous Alavi, P.E.
Company: Sierra Transportation Engineers, Reno, Nevada
Location of Services: Reno, Nevada

STE reviewed the current MDT ride specification for flexible pavements and compares it with current literature and state-of-practice. An extensive state-of-practice survey of other Departments of Transportation (DOTs) was conducted and the results were utilized to provide recommendations to MDT for improving its ride specification. Proposed improvements were recommended for the current ride specification, tolerances, project classification levels, analysis tools and indices, and methods of acceptance. As part of the recommendations, a series of new documents (i.e., Profiler Operations Manual, QC/QA Plan) were developed to enhance future profile data collection and analysis.

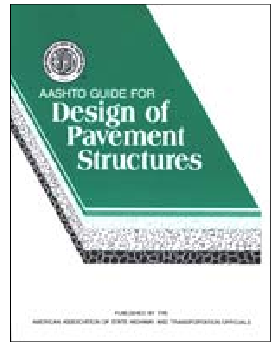
Development of a Pavement Management Program for the City Of Sparks –

Contact Person: Mr. Jon R. Ericson, P.E.,
Transportation Manager
Contact Telephone Number: 775-353-7809
Dates of Service: July 2006 – December 2006
Cost: $69,250
Project Status: Ongoing and within budget
Project Manager: Dr. Sirous Alavi, P.E.
Company: Sierra Transportation Engineers, Reno, Nevada
Location of Services: Sparks, Nevada



City of Sparks has a five-year budget outlook for maintenance, rehabilitation, and reconstruction activities of their roadway network. STE has been asked to develop a system through which available annual budget is effectively utilized to enhance the roadway network via proper and timely pavement preservation strategies. STE will be utilizing linear programming techniques to optimize the available budget using life-cycle cost analysis on the existing roadway network and utilizing the state-of-practice pavement preservation techniques.

RTC of Washoe County Flexible Pavement Design Manual –



Contact Person: Mr. William Vann, P.E.,
RTC of Washoe County
Contact Telephone Number: 775-335-1877
Dates of Service: July 2005 – September 2006
Cost: $49,700
Project status: Ongoing and within budget
Project Manager: Dr. Sirous Alavi, P.E.
Company: Sierra Transportation Engineers, Reno, Nevada
Location of Services: Reno, Nevada

Each year the Regional Transportation Commission (RTC) leads the effort in many roadway improvements throughout Washoe County. The majority of roadways in need of rehabilitation or reconstruction are flexible pavements. RTC recommends the use of the 1993 edition of the American Association of State Highways and Transportation Officials (AASHTO) *“Guide for Design of Pavement Structures,”* and excerpts have been incorporated into this pavement design manual. The objective of this flexible pavement design manual is to provide RTC, other agencies in Washoe County, and consultant pavement designers with a uniform and detailed procedure for designing asphalt concrete pavements on RTC projects using AASHTO design procedures. The manual provides specific design input parameters and identifies the steps necessary to achieve consistent layer thickness designs based on local practices.

Economic Impact Study of Reno/Tahoe International and Stead Airports –

Contact Person: Ms. Krys Bart,
Executive Director, Reno/Tahoe International Airport
Contact Telephone Number: 775-328-6402
Dates of Service: July 2004 – March 2005
Cost: $34,000
Project Manager: Dr. Kambiz Raffiee:
Location of Services: Reno, Nevada

This report was prepared by the Bureau of Business and Economic Research of the University of Nevada, Reno. The study was funded by the Airport Authority of Washoe County and the Applied Research Initiative Program of the Office of VP for Research at the University of Nevada, Reno.

The project, started in July 2004, examined the economic impact of the operations of Reno/Tahoe International and Stead Airports in the calendar years of 2003 and 2004. Specifically, spending on capital improvement projects, spending by visiting passengers, spending by vendors, spending by private sector companies and governmental agencies were the key ingredients included in the economic impact of the airports. The analysis of spending on capital improvement projects involved a detailed cost analysis of construction projects by the airports to make sure that only spending on the projects in the local economy is included in the economic impact analysis. The same detailed analysis was done for spending by vendors, private sector companies, and governmental agencies to make sure that only spending by these entities in the local economy is included in the economic impact analysis. The Implan, an economic impact analysis software, was used to estimate the employment impact, indirect impact and induced impact of the operations of the airports in the calendar years of 2003 and 2004.

4.1.2 RESUMES / COMPANY PROFILE AND EXPERIENCE

Company Profile

Sierra Transportation Engineers, Inc. (STE) was incorporated in May, 2003. STE is a full service specialty firm in Reno, Nevada providing Pavement Engineering, Traffic & Transportation Engineering, and Information Management services to the public and private sectors. Members of the firms have developed an excellent standing in the engineering community based on their dedication, integrity, productivity, enthusiasm, and overall quality of work. STE is equipped with the state-of- the-art computer software and hardware. The software packages include engineering applications, statistical analysis, spreadsheets, word processing, presentations, and programming. In September of 2003, the firm acquired a five-year $813,000 contract with FHWA for the Long Term Pavement Performance (LTPP) Materials Reference Library (MRL).

As described in the cost proposal (Section 5), STE's accounting system was audited by Defense Contract Audit Agency (DCAA) in December 12, 2003 and the results of audit showed that STE's accounting system is adequate for accumulating and billing costs under Government contracts with no exceptions.

Since its inception, the firm has acquired over sixty (60) transportation engineering projects from Federal, States, Regional Agencies, and the private sector. Among them is the recently completed project for MDT namely, Ride Specification Review.

Staffing Organization

STE has assembled a talented team of professionals with years of experience in transportation engineering, economics, statistics, and first hand knowledge of State Agencies. The team was selected with a diverse background in academia, industry, and consulting services to provide MDT the highest quality of services for this project.

An organizational chart is provided in Figure 4.1.

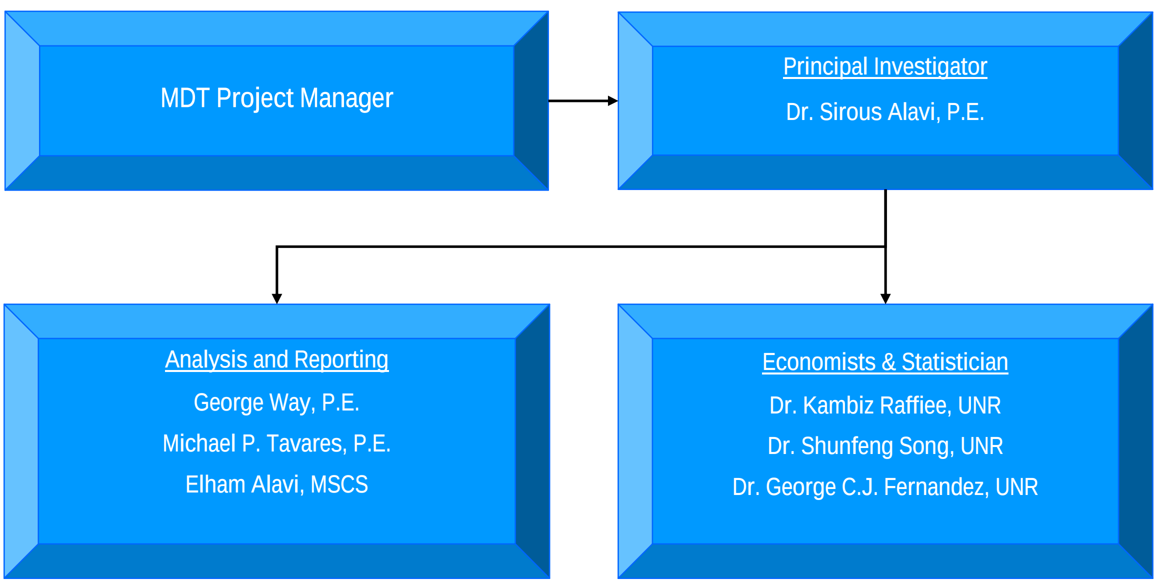


Figure 4.1. STE Team Organizational Chart.

Appendix B provides resumes for key STE team members. The resumes provide previous work experience, including the names, addresses, and phone numbers of the contact persons. Appendix C provides letters of commitment from STE consultants on this project. A biographical summary of each key member of the STE team is provided on the next few pages.

STE Team

Dr. Sirous Alavi, P.E., Principal Investigator Manager

Dr. Alavi is proposed to serve as the Principal Investigator for this project. Dr. Alavi recently served as the Project Manger for MDT Ride Specification Review project. This project was completed in June, 2006.

Dr. Alavi has managed over $35 million of U.S. highway research projects in over 20 years of professional experience in the US highway community. He is a graduate of the University of California at Berkeley with a Ph.D. in Civil Engineering, specializing in Transportation Engineering. He is a member on TRB Committee A2B03 on Flexible Pavement Design and also TRB committee A2B08, Highway Traffic Monitoring. He has served as the Co-Principal Investigator and also the Joint Principal Investigator for the WesTrack project, which started as a FHWA project and ended as NCHRP 9-20. He also served as the Principal Investigator for the multi-million dollar LTPP Western Regional Contract for over four years. Prior to his affiliation with STE, Dr. Alavi worked at Nichols Consulting Engineers (NCE) as a Chief Engineer and Director of Research from June, 1996 to May, 2003. Some of his related experience includes:

- Project Manager for MDT Ride Specification Review – The purpose of this project was to review the MDT asphalt ride specification and compare it with current literature and state of practice. Upon completion of this review, recommendations were made for improvements to the current ride specification. As part of this study, STE conducted a thorough literature review, and a successful state of the practice survey. STE was awarded a second phase of this study in April of 2005 to assist in implementing the products developed during the first phase of the project. The project was successfully completed in June, 2006.

- Principal Investigator for the LTPP Western Regional Contract – Responsible for all aspects of project management, data collection (including profile data), processing, quality assurance (QA) checks, and input of the pavement data from 12 Western States (including Montana) and two Canadian Provinces into the national LTPP database.

- Co-Principal Investigator for the FHWA/NCHRP $15 million WesTrack Project - Responsible for day-to-day management of all aspects of NCE (his employer at the time) contract for pavement evaluation, monitoring, and performance model development. The two main objectives of this project were the development of performance-related specifications (PRS) for hot-mix asphalt pavements and validation of Superpave mix design process.

- Principal Investigator for the Superpave Evaluation Study for the Regional Commission (RTC) of Washoe County, Nevada - Investigate the conformity of Superpave mix design procedures to local environment in Washoe County, Nevada. This work will lead to the calibration of Superpave design method to local RTC environmental and construction conditions.

- Principal Investigator for the State of Arizona project involving highway network traffic load estimates and forecasting using LTPP and non-LTPP Weigh-in-Motion (WIM) data-- Responsible for the development of a new equivalent single axle load (ESAL) table for the State of Arizona highway network (over 1000 segments and 7000 lane miles) and a user friendly database for inputting, calculating, and forecasting ESAL related data. This project was completed in June of 2000.

- Principal Investigator for the Civil Engineering Research Foundation (CERF) Highway Innovative Technology Evaluation Center (HITEC) $250K WIM study -Responsible for an evaluation study including laboratory work, field testing, and accelerated loading of WIM sensors using the WesTrack facility for asphalt pavements and the California Department of Transportation (Caltrans) Heavy Vehicle Simulator (HVS) facility in Palmdale, California, for Portland cement concrete pavements final report was submitted in December, 2000.

- Project Manager for the development of the FHWA WesTrack database software - Responsible for managing the development of a "stand alone" user friendly software that included all the WesTrack project data and was developed using Visual Basic programming tools.

- Project Manager for the development of a Pavement Management Program for the City of Sparks, Nevada to optimize the use of available annual budget in properly and effectively preserve the existing roadway network.

Dr. Alavi's education, professional, and management experience makes him well qualified to serve as the Project Manager for this project.

Time Commitment – Dr. Alavi is currently the project manager for FHWA LTPP Materials Reference Library (MRL) contract. This is a five year contract started in September of 2003. Dr. Alavi's time commitment to the MRL project is 10%. His other anticipated project related commitments at STE take an additional 35% of his time. Dr. Alavi's time availability will be over 50% which is sufficient to successfully accomplish his project responsibilities.

George Way, P.E., STE Chief Engineer

Mr. Way is a Chief Engineer with STE. He is an engineering graduate of Arizona State University and a registered professional engineer in Arizona. Before joining STE he worked for the ADOT for 35 years. When he retired from ADOT in 2004, he was the Chief Pavement Design Engineer. His experience with ADOT involved all facets of Materials Testing, Materials Pavement Research, Pavement Condition Inventory, Pavement Management, Asphalt and Asphalt Rubber Mix Design, Concrete Mix Design, Pavement Structural Design, and all related materials composing the pavement structure from the soil foundation to the surface of the pavement. He is an active member of many engineering Associations and Societies and recipient of numerous awards around the world. He has authored well over a hundred pavement engineering related papers and lectured all over the world. He served on the National Cooperative Highway Research Program (NCHRP) Project 1-37A advisory panel for the development of the 2002 Guide for Mechanistic-Empirical Design of New and Rehabilitated Pavement Structures.

Mr. Way developed the ADOT Pavement Management System and started the Pavement Management Section in 1979. From 1979 until 1995 supervised the Pavement Management Section. In 1988 he was promoted to Chief Pavement Design Section Engineer and supervised both the Pavement Design and Pavement Management Sections. In 1981 he developed the first of several five year ADOT Pavement Preservation Funding Policies which estimated the level of program funding to preserve the ADOT highway network at prescribed levels of service. Each of these policies was approved by the ADOT Director and Arizona State Transportation Board.

As the policies began to reflect better statewide levels of pavement condition and service the preservation program grew to ultimately involve the programming of 40 or more preservation projects with a total value of approximately $70-100 million dollars per year. In the capacity of the Pavement Management Engineer from 1979 until 1998, Mr. Way participated in the Department's annual five year program development process. This process then and now involves the programming and initial cost estimating of approximately 250-350 projects valued at a total program cost of approximately one billion dollars. During this time participated in various studies to improve the Department's ability to estimate the cost of projects and to keep them on schedule.

As a major example of one of these project cost estimating and scheduling studies, Mr. Way was one of the project team members that developed ADOT's first formal Project Management Process. This multi-year study conducted in the early 1990's contained a problem statement that identified three significant problems that contributed to Department rework and unnecessary work and their associated extra cost. These problems were extensively studied by the Department team. The ADOT problems included "scope creep' as a major problem in accurately estimating the cost of a project. Scope creep was defined as a change in the original scope which adds cost and/or time to the project. Another problem was that it took too long to get a project developed and ready for bid and the development process is disconnected from the customers (internal in the Department and external). To address these problems the ADOT team conducted extensive interviews and surveys and developed means and methods to improve the process. His work on this multi-year study was concluded by the adoption of a formal Project Management Process in 1993. Following all of this work in later years, Mr. Way was often called upon to help in the cost estimating of many types of projects including not only preservation projects but also major new construction and new freeway projects.

Time Commitment- Mr. Way is currently working on STE's "Roadway Design Manual" for the Regional Transportation Commission of Washoe County, Nevada. Based on his current project commitments he will have over 50% time available for this project.

Dr. Kambiz Raffiee, Senior Economist

Dr. Raffiee is the Foundation Professor of Economics, Associate Dean and the Director of MBA program of the College of Business Administration at UNR. He received his Ph.D. in Economics from the University of Oregon. His areas of specialization are on the airline industry and economic impact of transportation systems. He has done extensive work involving cost-benefit analysis of air cargo and passenger systems at the Reno/Tahoe International Airport, public opinion survey of Reno/Tahoe International Airport and economic linkages of the air transportation systems in northern Nevada. He has published over fifty papers in nationally and internationally refereed journals that include the top ranked journals in transportation economics. He received the UNR Foundation Professor award in May 2001 in recognition of his significant contributions in research, teaching and service. He is also the recipient of the Best Researcher of the Year Award in Business Education in 1992 and 1998 from the Nevada Alpha Chapter of BETA GAMMA SIGMA, the highest honor society for collegiate schools of business in the United States. He is also a member of the Air Service Taskforce of Reno/Tahoe International Airport. He was a visiting scholar at the Transportation Department of the Stanford Research Institute (SRI) International in Spring 1992.

Dr. Raffiee will serve the project as a Senior Economist assisting the team in all aspects of developing efficient cost estimating procedures. His role as the Principal Investigator for the upcoming Nevada DOT project on “Methodology to Improve Highway Construction Project Cost Estimates for Transportation Programming Activities” will benefit the MDT project tremendously.

Time Commitment
As stated in Dr. Raffiee’s letter of commitment (Appendix C) he will have up to 32 hours a month during academic year and up to 48 hours a month during summers to contribute to this project.

Dr. Shunfeng Song, Senior Economist

Dr. Song received a BS in Mechanics from Peking University in 1983, China and Ph.D. in Economics from University of California at Irvine in 1992. Currently, he is a professor and the chair of Economics at UNR. His teaching and research interests include transportation economics, urban economics, and real state economics. His research papers on urban commuting and spatial structure have been published in various journals including *Journal of Political Economy, Journal of Urban Economics, Urban Studies, and Land Economics*. He has also done research on cost estimation in other areas, such as the paper with Kambiz Raffiee and Yiqi Luo about "The Economic Costs of Species Preservation: The Northern Nevada Cui-ui," published in Review of Regional Studies (1997). In 1995, he was awarded the Best Researcher of the Year, Nevada Alpha Chapter of Beta Gamma Sigma, the highest award in business education in the State of Nevada.

He will serve the project as a Senior Economist assisting the team in all aspects of developing efficient cost estimating procedures.

Time Commitment
As stated in Dr. Song’s letter of commitment (Appendix C) he will have up to 32 hours a month during academic year and up to 64 hours a month during summers to contribute to this project.

Dr. George Fernandez, Senior Statistician

Dr. Fernandez works as the statistician for the Nevada Agricultural Experimental Station and UNR Cooperative Extension. He has more than 18 years of experience in teaching courses such as introductory statistical methods, design and analysis of experiments, linear and non-linear regression, multivariate statistical methods and SAS programming. His has collaborated in many state and federal funded civil engineering projects such road pavement performance analysis and network optimization models and LTPP Data analysis on AC and PC databases. He has also served on more than 30 MS and Ph.D. civil engineering thesis projects and provided statistical advice to students and faculty. He is a professional SAS programmer and has over 25 years experience in SAS/BASE, SAS/IML®, SAS/STAT®, SAS/QC®, SAS/ETS®, SAS/INSIGHT®, SAS/ANLALYST®, SAS/LAB®, SAS/ASSIST® and SAS/GRAPH.

Accomplishments include winning best paper and poster presentation awards at regional and international conferences; presenting invited full-day workshops in many regional and national conferences on applications of user-friendly statistical methods in data mining; the keynote speaker at the 16th KSU Conference on Applied Statistics; served as an Expert Witness in the Justice Court Reno representing Cancer support Wizdom Thrift Store in Reno and analyzed daily sales transaction data and detected fraudulent transaction; and served as the program and section chair in organizing the Western SAS users Conference more than 7 times; serving as the statistical editor for 3 professional journals. He has published more than 100 research papers including refereed journal papers, invited and contributed articles in proceedings, and book chapters. His "Data Mining Using SAS Applications" book and the CD-ROM published by the Chpaman hall/ CRC press contains many user-friendly SAS macro applications and many international and national SAS users are currently using his user-friendly SAS macro applications for data analysis via on-line.

Time Commitment

As stated in Dr. Fernandez's letter of commitment (Appendix C) he will have up to 10 hours a month during academic year and up to 20 hours a month during summers to contribute to this project.

Michael P. Tavares, P.E., STE Senior Engineer

Mr. Michael P. Tavares is a senior engineer at STE. He is a graduate of the University of Texas at El Paso with a Master of Science Degree in Civil Engineering.

Mr. Tavares has recently been involved on MDT Ride Specification Review Project as a senior engineer. Prior to his affiliation with STE in May of 2003, Mr. Tavares worked at Nichols Consulting Engineers (NCE) as a professional staff on the LTPP team and conducted research in pavement engineering. He was involved in the Long-Term Pavement Performance (LTPP) program from 1998 to 2003. His research duties included reduction and analysis of profile, distress and traffic data. He also served as the LTPP Traffic Coordinator for approximately two years. His responsibilities included coordination with all agencies in the Western Region of LTPP. Mr. Tavares has experience in evaluating traffic data from the various agencies in the Western Region. Mr. Tavares was also involved in developing a site-specific ESAL table for the Colorado Department of Transportation (CDOT) with the ultimate goal of the project to improve the accuracy of the existing and forecasted traffic loads on CDOT's highway network. Another project Mr. Tavares served on compared regional Marshall mix designs with Superpave mix designs for the Regional Transportation Commission (RTC) of Washoe County. This project was the first attempt of RTC to evaluate local practices and assess to whether or not Superpave methodologies can be implemented easily and cost effectively.

Mr. Tavares's education and experience makes him well qualified to serve this project as a senior engineer providing expertise in data gathering, analyzing, and reporting.

Time Commitment – Mr. Tavares is currently involved in STE's local transportation projects at 40% time. He will have over 50% available time for this project.

Elham Alavi, M.S.C.S., STE Information Technology Expert

Ms. Elham Alavi is the Director of Information Management services at STE. She is a graduate of the University of Nevada, Reno with a Master of Science degree in Computer Science. Her areas of expertise include computer vision, compute programming, information technology, and development of databases.

She will serve the project as the Information Technology expert in charge of importing, exporting, and assembling project electronic files into various databases and spreadsheets.

Time Commitment – Ms. Alavi is currently involved in STE's local transportation projects at 60% time. Her other 40% time is available for this project.

4.1.3 METHOD OF PROVIDING SERVICES

A detailed description of the STE work plan has been presented in Section 3 of this proposal. In Section 4.1.2 of this proposal, time commitment of each key staff to this project based on their other work load is presented. A project schedule by task has been provided in Section 3.1, Figure 3.2.

SECTION 6: EVALUATION CRITERIA

STE understands and will comply.

RFP APPENDIX A: STANDARD TERMS AND CONDITIONS

STE understands and will comply.

RFP APPENDIX B: CONTRACT

STE understands and will comply.

REFERENCES

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2. Bruzelius, N., Flyvbjerg, B., and Rothengatter, W. (1998). “Big Decisions, Big Risks: Improving Accountability in Mega Projects.” *International Review of Administrative Sciences*, Volume 64, Issue 3, pp. 423-440.
3. Davidson, F.P. and Huot, J.C. (1989), “Management Trends for Major Projects.” *Project Appraisal*, Volume 4, Number 3, pp. 133-142
4. Federal Highway Administration. (June 4, 2004). “Major Project Program Cost Estimating Guidance.” http://www.fhwa.dot.gov/prgramadmin/mega/cefinal.htm.
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6. Fernandez G. 2002. Data Mining Using SAS Applications, ISBN NO: 1584883456 CRC/Chapman-Hall UK/USA http://www.ag.unr.edu/gf/dm.html